

Summary of FY 03 Nonnative Fish Management Annual Reports, and Plans for FY 04

More than 40 nonnative fish species can be found in the Upper Colorado River Basin, as compared to 14 native fish species. Negative interactions with certain warm-water nonnative fish species have contributed to declines in endangered and other native fish populations. Some nonnative fish prey upon endangered and other native fishes. Nonnative fish also compete with native fish for food and space.

In 2003, the Upper Colorado River Endangered Fish Recovery Program expanded efforts to identify management actions needed to minimize or remove the threat of nonnative fishes to survival of the endangered fishes, as described in the August 2002 recovery goals. The experimental nonnative fish management studies conducted in 2003 were designed to determine if the target species populations could be reduced to measurably lower levels. River sections were divided into “control” and “treatment” reaches. In control reaches, fish were captured, marked, and released back into the river during multiple sampling trips, after which the abundance (i.e., population size) of the target species was to be estimated. In the treatment reaches, fish were captured and removed from the river. At the end of the field season, the abundance of the target species in the treatment reaches was compared to the abundance in the control reaches to determine how effective the removal efforts were in reducing the abundance of the target species within the treatment reaches. Following are results for each river section studied, and plans for FY 04 nonnative fish management activities.

Colorado River

Boat electrofishing was used during five passes from June 30 through October 31, 2003, to capture channel catfish within a 39-mile reach between the Gunnison River and the Colorado/Utah State line. Within the control reaches, a total of 1,356 catfish were captured, marked (1,164 were floy-tagged), and released back into the river. Of the floy-tagged fish, 16 were recaptured, and 63 percent (10 of 16) of the recaptured fish had moved outside of the control reaches from which they were captured. From the treatment sections, 1,236 catfish were removed and stocked into Highline Lake. In addition, trap nets set in backwaters of the control reaches captured 820 catfish which were marked (fin-clipped) and released back into the river. Catfish mortality resulting from sampling and handling was slightly less than 1 percent.

No depletive effects in abundance, density, or lengths as a result of catfish removal were demonstrated in 2003. Based on the recaptures of floy-tagged fish, the capture rate for catfish was estimated at 1.4 percent.

The control/treatment approach was considered to be ineffective because of fish movements. In the Colorado River, upstream movement of catfish from the initial point of capture ranged to 43 miles (average 12.5 miles); downstream movement ranged to 18 miles (average 4.5 miles). Each control and treatment reach would need to be 61 miles in length to encompass movements of catfish that were located in the center of the reach.

Also captured during this effort were 307 smallmouth bass and 161 largemouth bass, all of which were removed from the river and stocked into Highline Lake. Abundance of these species

appears to be increasing within this section of the Colorado River. Although fewer in number, these species are considered a potentially greater threat to the endangered fishes than catfish. Although catfish continue to pose a threat to the endangered fishes, especially because of their overwhelming abundance, bass are more piscivorous than catfish. However, efforts to manage catfish abundance in the Colorado River has been put on hold temporarily, but will resume if and when more-effective capture techniques can be developed. In the meantime, efforts during 2004 will focus on removal of smallmouth bass and largemouth bass before they increase to a level that may become unmanageable. Three sampling passes from Price-Stubb to the Colorado-Utah State Line are planned; all bass captured will be provided to CDOW for a stable isotope study.

Yampa River - Upper

In the upper Yampa River between Hayden and Craig, fyke nets and electrofishing (three sampling passes) were used to capture northern pike. Within the treatment reaches (and from the fyke nets), 583 pike were captured, removed from the river, and stocked into the Yampa State Wildlife Area ponds and/or Loudy-Simpson. Within the control reaches, 273 northern pike were captured, floy-tagged, and returned to the river. Pike ranged in length from 4.6 inches to 39 inches (average length 21.6 inches).

No depletive effects were demonstrated during 2003. Of the northern pike that were floy-tagged in the control reach, 16 (5.9%) were recaptured. Of those, 11 (69 percent) had moved outside of the control reaches from which they were captured. The movement of pike was suggested as a factor that invalidated the control/treatment approach.

In 2004, depletion analyses will be used instead of the control/treatment approach, and sampling efforts will be increased to determine the level of effort necessary to demonstrate a depletive effect. Fyke nets will continue to be used, and the number of electrofishing passes will be increased to six. On the first pass, all northern pike and smallmouth bass will be marked and released back into the river. On five subsequent passes, northern pike will be removed from the river and stocked into area ponds; smallmouth bass will continue to be marked and returned to the river.

In addition, to determine if the Yampa River upstream from Hayden is a source of northern pike and smallmouth bass moving into critical habitat, sampling will be conducted between Catamount Reservoir and Hayden. During three electrofishing passes, bass and pike that are captured will be marked and returned to the river.

Yampa River - Middle

In the middle Yampa River between Craig and Deerlodge Park, northern pike were captured during five sampling passes using electrofishing and fyke nets between April 23 and July 3, 2003. A total of 298 northern pike were captured, of which 78 (26.2%) were recaptured, resulting in an estimated population size of 565 (483 to 679) within the 70 river miles that were sampled. Capture probability was estimated at 21 percent. Of note, a 30-inch pike was captured with a 20-inch Colorado pikeminnow lodged in its throat.

All northern pike captured during 2003 were tagged and returned to the river, except from the 8-mile treatment reach where 38 northern pike were removed and stocked into the Yampa State Wildlife Area ponds. Too few fish were removed in 2003 to demonstrate a depletive effect. To determine the level of effort necessary to demonstrate a depletive effect, the number of sampling passes will be increased in 2004, and depletion analyses will be used instead of the control/treatment approach. Northern pike removed from the river will continue to be stocked into area ponds.

Smallmouth bass were also targeted in the middle Yampa River. A total of 1,407 smallmouth bass were captured, tagged, and returned to the river within the 12-mile study area, of which 185 (13.1%) were subsequently recaptured. Reliable population estimates could not be calculated for the 3-mile treatment/control study reaches because 45–55 percent of the fish moved into or out of the reaches. A total of 294 smallmouth bass were removed from the treatment reaches and stocked into Elkhead Reservoir. Of those, 3 fish (1 percent) died from sampling/handling stress.

No depletion effects were demonstrated during 2003. Movements of smallmouth bass suggest a need to either lengthen the study reaches or use an alternative approach to control/treatment.

Channel catfish were also captured, tagged, and returned to the river throughout the 70-mile study area between Craig and Deerlodge Park. A total of 364 catfish were tagged, of which 7 (2 percent) were recaptured. The purpose of this effort was to determine if catfish in this section of river move downstream into Yampa Canyon. No results are available as yet.

In 2004, depletion analyses will be used for northern pike instead of the control/treatment approach, and sampling efforts will be increased to determine the level of effort necessary to demonstrate a depletive effect. On the first pass, all northern pike will be marked and released back into the river. On five subsequent passes, northern pike will be removed from the river and stocked into area ponds. For smallmouth bass, the treatment/control approach will be used in two concentration areas, and the number of sampling passes will be increased.

Yampa River - Lower

In the lower Yampa River (river miles 0 to 46) during June through August, channel catfish were captured using electrofishing (two passes), angling (two passes), and fyke nets. The fyke nets were not effective and have been discontinued. A total of 3,563 catfish were removed from the treatment reaches, of which 28 were stocked into Kenny Reservoir. Of the 387 catfish captured in the control reaches, only two (0.5%) were recaptured. No depletive effects of removal were detected during 2003. Catch rates may have been affected by the effect of flows on sampling efficiency; the increases in abundance caused by immigration and/or production; gear efficiency; and/or habitat types sampled. Of note, smallmouth bass were the second most abundant species; 351 were captured.

In 2004, depletion analyses will be used instead of the control/treatment approach, and sampling efforts will be increased to determine the level of effort necessary to demonstrate a depletive

effect. On the first pass, all smallmouth bass and channel catfish will be marked and released back into the river. On four subsequent passes, bass and catfish will be removed and, because of the remoteness of Yampa Canyon, euthanized, except on the last day of each trip, when fish will be transferred to CDOW for stocking into Elkhead Reservoir or Kenney Reservoir.

Green River

Between March 31 and June 26, 2003, northern pike concentration areas were sampled using fyke nets, trammel nets, and electrofishing. A total of 22 northern pike and one tiger muskie was removed from the river. Of note, four of the pike had razorback suckers in their stomachs. Although removal efforts have remained the same as in previous years, fewer pike are being encountered (248 in 2001; 42 in 2002; 22 in 2003), suggesting a depletive effect. Other species encountered included channel catfish, smallmouth bass, walleye, flannemouth sucker, Colorado pikeminnow, razorback sucker, bluehead sucker, and roundtail chub. Another note, smallmouth bass numbers seem to be increasing. During 2004, northern pike removal will be expanded downstream of the White River confluence to Sand Wash.

As part of sampling to develop Colorado pikeminnow and humpback chub population estimates from March 24 through June 6, 2003, channel catfish were marked and released during four sampling passes from Sand Wash (river mile 216) to Swasey's Rapid (river mile 132). A total of 1,116 catfish were captured, of which 6 (0.5%) were recaptures. One of the recaptured fish had moved 42 miles. Other nonnative fish encountered included 11 smallmouth bass and one walleye.

A July through September control/treatment experiment had been planned for channel catfish management in Desolation/Gray canyons, but was thwarted because of low flows in 2003. Instead, the experiment was conducted using fyke nets and angling in a 22-mile reach below Ouray (White River to Sheep Wash; river miles 245.8 to 233.3), and from Sand Wash to Rock House Rapid (river miles 220 to 200). In the White River to Sheep Wash reach, 383 catfish were captured, as well as 130 black crappie, 13 smallmouth bass, flannemouth sucker, and bluehead sucker. In the Sand Wash to Rock House reach, 372 catfish were captured, as well as black crappie, smallmouth bass, carp, green sunfish, flannemouth sucker, and humpback chub.

It appears that smallmouth bass may be increasing in abundance and distribution in the Green River. Therefore, efforts in 2004 will focus on removal of smallmouth bass before they increase to a level that may become unmanageable. In 2004, smallmouth bass will be removed from Echo Park to Swasey's Beach. Depletion analyses will be used to determine depletive effects. Channel catfish management will be put on hold temporarily, but will resume if and when more-effective capture techniques can be developed.

Duchesne River

From the Myton Diversion (river mile 41) to the Green River confluence (river mile 0), the Duchesne River was divided into control and treatment reaches to evaluate the effectiveness of control efforts for smallmouth bass, channel catfish, and northern pike. Unfortunately, flows in 2003 were too low to use a boat for electrofishing. As a result, four areas (3.7 total river miles) that could be accessed by land were waded and sampled with barge and backpack shocking units. A total of 46 smallmouth bass, 24 channel catfish, and 4 black crappie were captured and removed. Daily catches were transported to Elder's Pond by members of the Ute Tribe.

There were not enough fish captured to evaluate the effectiveness of the effort. Work will continue in 2004 (three sampling passes), and depletion analyses will be used instead of the treatment/control approach.

White River

The White River from river mile 72 to the confluence with the Green River (river mile 0) was divided into control and treatment reaches to evaluate the effectiveness of control efforts for channel catfish. A total of 905 catfish were captured. Within the control reach, 190 catfish were captured, of which 3 (1.6%) were recaptures. Other nonnative fish encountered included one smallmouth bass and one yellow bullhead.

Efforts to manage catfish abundance in the White River have been put on hold temporarily, but will resume if and when more-effective capture techniques can be developed. Also, management of smallmouth bass in other portions of the Upper Basin is currently considered higher priority.

Summary

The treatment/control approach did not appear to work very well, possibly because river reaches are not closed systems. The target species tended to move among the reaches sampled during the sampling period, and it is unknown how many may have left the study areas altogether. For example, catfish in the Colorado and Green rivers were found to move as far as 42 miles from initial capture locations. This made it difficult to develop accurate population estimates that were to be used to determine the effectiveness of removal by comparing treatment versus control or before versus after. Nonnative fish management experiments planned for 2004 will use alternative approaches to treatment/control, primarily depletion analyses.

Recapture rates for channel catfish were very low in 2003 (i.e., Colorado River 1.4 %, Middle Yampa River 2%, Lower Yampa River 0.5%, Green River 0.5%, White River 1.6%). This may

suggest that 1) the abundance of catfish in the targeted areas may be overwhelming, 2) the ability to capture enough individuals to make a measurable difference is hampered by low capture efficiency, 3) movement of catfish into the target area equaled or exceeded harvest, 4) production of catfish within the target area equaled or exceeded harvest, and/or 5) movement of catfish into and out of the study area thwarted recapture efforts.

Discussion

The goal of nonnative fish management is to create “holes” in fish abundance and biomass via removal of targeted species, and hope that those “holes” will refill with native and endangered species. Several factors may explain why nonnative fish management efforts to date have not demonstrated measurable depletive effects (i.e., “holes”) in targeted populations.

1. Fish harvest may have been equaled or exceeded by fish production. Some species (e.g., small cyprinids) are prolific, reproducing several times a year, and the resultant offspring can grow to adult size within weeks. Harvesting such species appears to produce results akin to mowing the lawn or pruning shrubs: it seems to stimulate growth and production.
2. Fish harvest may have been equaled or exceeded by fish moving into the targeted reach from upstream, from downstream, from tributaries, and from floodplain ponds. Removing targeted species from their preferred habitats may be like trying to dig a hole in water; the hole fills quickly with fish moving in to occupy the preferred habitats.
3. The abundance of some species may be so overwhelming as to be considered unmanageable. Certain species populations may have been manageable shortly after introduction into the system, but then subsequently became out of control. That is one reason the Recovery Program has recently redirected emphasis from channel catfish toward management of smallmouth bass. It is hoped that it is not too late to control recently-observed smallmouth bass increases in distribution and abundance, to put out the brush fires before they become a major forest fire. That is why periodic northern pike patrols in the Green River will likely continue, to ensure that the species is held to a manageable level.
4. With the exception of northern pike management in the Gunnison and Green rivers, capture efficiency may have been inadequate for most of the targeted species. Although researchers have become more experienced with various gear types and sampling strategies, they have yet to achieve the desired depletive effects in many cases. Some of the factors that may affect capture efficiency include flow levels, habitat types, seasonal and diurnal movements and behavior of the targeted species, relative abundance and productivity, etc.